Menoufiya University
Faculty of Engineering
Shebin El-Kom
Second Semester Exam.
Academic Year: 2016-2017

Department: Basic Science of Engineering
Year: diploma
Subject/Code: **Solid State Physics**
Time Allowed: **3 hours**
Date: 7 / **6** /**2017**

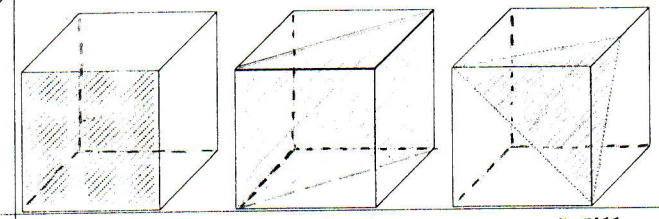
Answer the Following Questions: (100 *marks*)

Question 1: (25 *marks*)

a) Solids are classified into crystalline and amorphous materials, study this statement, and describe the seven crystalline systems.

b) Sketch the following planes in a cubic unit cell
a) (0 3 2) b) (4 4 2) c) $(\bar{1}\,\bar{1}\,\bar{2})$

c) Determine the indices for the plans shown in following fig.



d) Describe and explain how to use Miller indices to determine the spacing between crystalline planes.

Question 2: (25 *marks*)

a) Compare between face centred cubic (FCC), body centred cubic (BCC), and hexagonal close-packed (HCP) crystalline structures.

b) The presence of attractive interatomic forces leads to the bonding in solids, describe and explain the several types of bonding.

c) Write notes on the generation and absorption of *x*-rays and Bragg's law.

d) Describe and explain the powder method to determine crystal structure by x-ray.

Question 3: (25 *marks*)

a) Explain the theoretical and real shear strengths of crystals.

b) Derive an expression for the dependence of the heat capacity of solids at constant volume (C_V) on the temperature (T).

Question 4: (25 *marks*)

a) Write notes on .....
a) relaxation time and mean free path.
b) electrical conductivity of pure metals.

b) In magnetic properties; explain the Hysteresis loop and the magnetic properties of solids.

With our best wishes